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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte EPHRAIM GUTMARK and CHRISTIAN OLIVER
PASCHEREIT

Appeal 2008-4686
Application 10/725,562
Technology Center 3700

Decided: December 12, 2008

Before JENNIFER D. BAHR, LINDA E. HORNER, and STEFAN
STAICOVICI *Administrative Patent Judges*.

STAICOVICI, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Ephraim Gutmark et al. (Appellants) appeal under 35 U.S.C. § 134
from the Examiner's decision rejecting claims 1-8 and 16. Claims 9-15 have

been canceled.¹ We have jurisdiction over this appeal under 35 U.S.C. § 6 (2002).

THE INVENTION

The Appellants' invention is drawn towards a method and a device for affecting thermoacoustic oscillations in a combustion system 1 (Spec. 1, ll. 6-8). The combustion system 1 includes at least one burner 2 and at least one combustor 3 (Spec. 5, ll. 12-14 and fig. 1). A central recirculation zone 7 is formed in the combustor 3 as a result of the burner 2 exhibiting an abrupt increase in cross-sectional area at its transition to the combustor 3 (Spec. 5, ll. 16-19 and fig. 1). Fuel is injected in a modulated manner into the recirculation zone 7 such that dampening or suppression of the thermoacoustic oscillations in the combustion system 1 occurs (Spec. 5, ll. 30-37).

Claim 1 is representative of the claimed invention and reads as follows:

1. A method of affecting thermoacoustic oscillations in a combustion system having at least one burner and at least one combustor, the method comprising:

modulating fuel injection into a recirculation zone which forms in the combustor.

¹ We refer herein to the Appeal Brief ("App. Br."), filed July 5, 2007, the Supplemental Appeal Brief ("Supp. App. Br."), filed September 6, 2007, the Examiner's Answer ("Ans."), mailed December 13, 2007, and the Reply Brief ("Reply. Br."), filed February 12, 2008.

THE REJECTIONS

The Examiner relies upon the following as evidence of unpatentability:

Gutmark US 6,464,489 B1 Oct. 15, 2002

The following rejections are before us for review:²

The Examiner rejected claims 1-3, 5-8, and 16 under 35 U.S.C. § 102(b) as anticipated by Gutmark.

The Examiner rejected claim 4 under 35 U.S.C. § 103(a) as unpatentable over Gutmark.

THE ISSUES

1. Have the Appellants shown that the Examiner erred in finding that Gutmark describes a method for affecting thermoacoustic oscillations by “modulating fuel injection into a recirculation zone?”
2. Have the Appellants shown that the Examiner erred in interpreting the claim term “modulate” to mean “at a constant rate?”
3. Have the Appellants shown that the Examiner erred in finding that Gutmark describes modulating fuel injection either “independently” or “coupled to an oscillation phase” of the thermoacoustic oscillations?

² The rejections of claims 1-8 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-6 of co-pending U.S. Application No. 10/725,563 and, over claims 1-6 of co-pending U.S. Application No. 10/725,564, have been withdrawn by the Examiner (Ans. 2 and 3).

4. Have the Appellants shown that the Examiner erred in finding that Gutmark describes injecting fuel “exclusively” in a modulated manner and, “exclusively” into the recirculation zone?

We AFFIRM the Examiner’s rejection as to claims 1 and 16, and REVERSE the Examiner’s rejection as to claims 2-8.

FINDINGS OF FACT

The record supports the following findings of fact by a preponderance of the evidence:

1. Gutmark describes a device and a method for suppressing thermoacoustic vibrations in a combustion system having a burner 14 and a combustion chamber 16 (col. 1, ll. 43-46; col. 7, ll. 34-36; fig. 6).
2. Gutmark describes injecting fuel into the burner 14, mixing the fuel with air in the burner 14, and introducing the fuel and air mixture into the combustion chamber 16 along a central (longitudinal) direction (col. 7, ll. 45-51 and figs. 6 and 9).
3. Gutmark further describes shear layers in the combustion chamber as mixture zones where fluid flows with changing or different velocities adjacent to each other are present, as *e.g.*, in the center of a swirl flow or in the boundary layers of a fluid flow adjacent to a wall (col. 2, ll. 11-16 and 19-22 and fig. 1a).
4. Gutmark further discloses an abrupt increase in the cross-sectional area between the burner and the combustor (figs. 1a and 6).

5. Gutmark describes an area of slow velocity forming in the center of the combustor as a result of “recirculating flow” (col. 7, ll. 57-61 and figs. 1a and 6).
6. Gutmark also describes that thermoacoustic instabilities can be induced by changes in equivalence ratio (fuel injection modulation) (col. 3, ll. 22-31).
7. In the Appellants’ combustion system 1 a recirculation zone 7 forms in the center of the combustor 3 due to an abrupt increase in the cross-section between the burner and the combustor (Spec. 5, ll. 16-19 and fig. 1).
8. The Appellants define “modulated fuel injection” as “any time-varying injection of liquid or gaseous fuel” (Spec. 12, ll. 11-13).

PRINCIPLES OF LAW

1. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, *cert. denied*, 484 U.S. 827 (1987). It is not necessary that the reference teach what the subject application teaches, but only that the claim read on something disclosed in the reference, i.e., that all of the limitations in the claim be found in or fully met by the reference. *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 772 (Fed. Cir. 1983).
2. When construing claim terminology in the United States Patent and Trademark Office, claims are to be given their broadest reasonable interpretation consistent with the specification, reading claim

- language in light of the specification as it would be interpreted by one of ordinary skill in the art. *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004).
3. The transitional term “comprising”, which is synonymous with “including,” “containing,” or “characterized by,” is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. *See Mars Inc. v. H.J. Heinz Co.*, 377 F.3d 1369, 1376 (Fed. Cir. 2004).
 4. An applicant is entitled to be his or her own lexicographer and may rebut the presumption that claim terms are to be given their ordinary and customary meaning by clearly setting forth a definition of the term that is different from its ordinary and customary meaning(s). *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).
 5. Under principles of inherency, when a reference is silent about an asserted inherent characteristic, it must be clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991).

OPINION

Issue (1)

The Appellants argue that Gutmark does not disclose “modulating fuel injection into a recirculation zone” of a combustor (App. Br. 12). According to the Appellants, the Examiner is relying on “an inherency theory to allege anticipation” of the above mentioned claim limitation (App.

Br. 12). Specifically, the Appellants appear to argue that although fuel is injected into a combustor having recirculation zones, this does not necessarily mean that the fuel is injected “into” the recirculation zone itself, as required by claims 1 and 16 (App. Br. 12). The Appellants further argue that just because air is blown into a room having a desk with an open drawer, it does not necessarily mean that air is blown into the drawer (App. Br. 12). In response, the Examiner takes the position that Gutmark explicitly describes the limitation of “modulating fuel injection into a recirculation zone” of a combustor (Ans. 4). We agree with the Examiner for the following reasons.

In the Appellants’ combustion system, a recirculation zone forms in the center of the combustor due to an abrupt increase in the cross-section between the burner and the combustor (FF 7). Similarly, Gutmark discloses both an abrupt increase in the cross-section between the burner and the combustor (FF 4) and a “recirculating flow” in the center of the combustor (FF 5). Due to the similarity between the Appellants’ combustion system and that of Gutmark, a person of ordinary skill in the art would readily appreciate that a central recirculation zone will likewise form in the combustion system of Gutmark. Moreover, Gutmark describes that fuel injection into the combustor occurs along a centrally oriented direction (longitudinally) (FF 2). Gutmark further suggests that fuel injection may be modulated (FF 6). Therefore, because the “recirculation zone” of Gutmark is centrally located in the combustor and the fuel is injected in a modulated manner in a centrally oriented direction, a person ordinarily skilled in the art would readily understand that the fuel in the combustion system of Gutmark is injected in a modulated manner into the recirculation zone, as required by

claims 1 and 16. Furthermore, the usage of the transition term “comprising” does not exclude fuel injection from occurring in other portions of the combustor in addition to the recirculation zones. The ordinary and customary meaning of the word “into” is to indicate “entry, introduction, [or] insertion.” *Merriam Webster’s Collegiate Dictionary* 613 (Tenth Ed. 1997). Hence, as long as injected fuel “enters” (is introduced, inserted into) the recirculation zone of the combustor of Gutmark, then the teachings of Gutmark satisfy the claimed limitation. Because the recirculation zone of Gutmark is centrally located in the combustor, and the fuel is injected into the combustor along a centrally oriented direction, the fuel will necessarily “enter” the recirculation zone, as required by claims 1 and 16. In conclusion, the Appellants’ arguments do not persuade us the Examiner erred in rejecting claims 1 and 16 as anticipated by Gutmark. Therefore, the rejection of claims 1 and 16 is sustained.

Issue (2)

The Appellants argue that Gutmark does not describe injecting a first and a second quantity of fuel at a constant rate and in a modulated manner, respectively, as recited in claim 2 (App. Br. 13). In response, the Examiner takes the position that the “broadest reasonable interpretation of the term ‘modulate’ is to keep in proper measure...which the examiner reads as ‘at a constant rate’” (Ans. 5). However, the Appellants specifically define “modulated fuel injection” to mean “any time-varying injection of liquid or gaseous fuel” (FF 8). Where an explicit definition is provided by the applicant for a term, [the] definition will control interpretation of the term as it is used in the claim. *Toro Co. v. White Consolidated Industries Inc.*, 199

F.3d 1295, 1301 (Fed. Cir. 1999). Therefore, the Examiner's interpretation of the term "modulated" to mean "at a constant rate" is flawed. The Examiner has not shown, and we could not find, any teaching in Gutmark that would be understood by a person of ordinary skill to encompass injecting a first and a second quantity of fuel at a constant rate and in a modulated manner, respectively. As such, the rejection of claim 2 cannot be sustained. Similarly, the rejection of claim 3, which depends from claim 2, cannot likewise be sustained.

The rejection of claim 4 as unpatentable over Gutmark is grounded in part on the Examiner's flawed interpretation of "modulated" to mean "at a constant rate" and thus also cannot be sustained.

Issue (3)

The Appellants argue that Gutmark does not describe modulating fuel injection "independently" of (claim 5) (App. Br. 13) or "coupled" to an oscillation phase of the thermoacoustic oscillations (claim 6) (Reply Br. 4). As far as we understand, the Examiner's position appears to be that Gutmark describes that the modulation of the fuel injection can be either "independently" of or "coupled" to an "oscillation phase of the thermoacoustic oscillations" (Ans. 5).

We agree with the Appellants that the Examiner has failed to establish that Gutmark describes explicitly or inherently modulating fuel injection either "independently" of or "coupled" to an "oscillation phase of the thermoacoustic oscillations." The portion of Gutmark relied on by the Examiner merely teaches that in a combustion system thermoacoustic instabilities can be induced (affected) by changes in equivalence ratio (fuel

injection modulation) (FF 6). While a thermoacoustic oscillation will inherently have an oscillation phase, the Examiner has not shown, and we could not find any teachings in Gutmark that describe, how the injection of fuel into the recirculation is performed in relation to an oscillation phase of the thermoacoustic oscillations. In other words, Gutmark merely teaches that thermoacoustic instabilities can be induced (affected) by fuel injection modulation, but says nothing regarding (1) an “oscillation phase” of the thermoacoustic oscillations, and (2) controlling the modulation of the fuel injection in relation to the “oscillation phase” of the thermoacoustic oscillations. Without more, a person of ordinary skill in the art would not be able to recognize from the teachings of Gutmark that the modulation of the fuel injection is necessarily either “independent” of or “coupled” to an “oscillation phase of the thermoacoustic oscillations.” As such, the rejection of claims 5 and 6 cannot be sustained.

Issue (4)

The Appellants argue that Gutmark does not describe injecting fuel “exclusively” into the recirculation zone (claim 7) and “exclusively” in a modulated manner (claim 8) (App. Br. 14). In response, the Examiner states in Gutmark the “fuel injection is modulated and it is directed into the recirculation zone” (App. Br. 6).

It appears that the Examiner has failed to give patentable weight to the term “exclusive.” The ordinary and customary meaning of the word “exclusive” is “single, sole.” *Merriam Webster’s Collegiate Dictionary* 404 (Tenth Ed. 1997). Gutmark describes injecting fuel into the combustion chamber (FF 2) which includes shear zones and a central recirculation zone

(FF 3 and 5). Hence, Gutmark does not describe injecting fuel “exclusively” (solely) into the recirculation zone, as required by claim 7.

Further, Gutmark teaches that thermoacoustic instabilities are induced (affected) by fuel injection modulation (FF 6). However, the Examiner has not shown, and we could not find any teachings in Gutmark that show, whether the injection of fuel is performed “exclusively” (solely) in a modulated manner, at a constant rate, or a combination of both. Hence, a person of ordinary skill in the art would not be able to recognize from the teachings of Gutmark that the injection of fuel injection is necessarily performed “exclusively” (solely) in a modulated manner, at a constant rate, or a combination of both. As such, Gutmark does not describe injecting fuel “exclusively” (solely) in a modulated manner, as required by claim 8.

In conclusion, the rejection of claims 7 and 8 cannot be sustained.

DECISION

The decision of the Examiner to reject claims 1-3, 5-8, and 16 under 35 U.S.C. § 102(b) as anticipated by Gutmark is affirmed as to claims 1 and 16, and reversed as to claims 2-3 and 5-8.

The decision of the Examiner to reject claim 4 under 35 U.S.C. § 103(a) as unpatentable over Gutmark is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED-IN PART

Appeal 2008-4686
Application 10/725,562

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